



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/707,908	01/23/2004	Jason M. Benz	BUR920030121US1	1907

29154 7590 03/13/2006

FREDERICK W. GIBB, III
GIBB INTELLECTUAL PROPERTY LAW FIRM, LLC
2568-A RIVA ROAD
SUITE 304
ANNAPOLIS, MD 21401

EXAMINER

RUGGLES, JOHN S

ART UNIT PAPER NUMBER

1756

DATE MAILED: 03/13/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/707,908	Applicant(s) BENZ, JASON M.	
	Examiner John Ruggles	Art Unit 1756	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 January 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☒ Claim(s) 13 and 14 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 January 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>1/23/04</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Drawings

New corrected drawings in compliance with 37 CFR 1.121(d) are required in this application because these drawings are informal and are also objected to for at least the reasons set forth below. Applicant is advised to employ the services of a competent patent draftsman outside the Office, as the U.S. Patent and Trademark Office no longer prepares new drawings. The corrected drawings are required in reply to the Office action to avoid abandonment of the application. The requirement for corrected drawings will not be held in abeyance.

Figures 1A-3B should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. Paragraph [0018] indicates that the instant invention is an improvement on the methodology illustrated by Figures 1A-3B (even if this methodology is not necessarily well known). See MPEP § 608.02(g). The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

The drawings are further objected to because the position of the recessed phase shifting (PS) opening 114 and non-PS opening 116 in the top view of Figure 7A are reversed with each other and do not correspond to their respective positions in the cross-sectional view of Figure 7B, which is taken from Figure 7A along line X-X' (as described in paragraphs [0015] and [0022]). Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or

Art Unit: 1756

figure number of an amended drawing should not be labeled as “amended.” If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either “Replacement Sheet” or “New Sheet” pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

The abstract of the disclosure is objected to because: (1) in lines 3-4, “the transparent quartz substrate” should be changed to --[[the]] a transparent quartz substrate-- and it is further suggested that (2) in line 9, “substrate that is adjacent the first region” should be changed to --substrate that is adjacent to the first region--. Correction is required. See MPEP § 608.01(b).

35 U.S.C. 112, first paragraph, requires the specification to be written in “full, clear, concise, and exact terms.” The specification is replete with terms, which are not clear, concise and exact. The specification should be revised carefully in order to comply with 35 U.S.C. 112, first paragraph. Examples of some unclear, inexact or verbose terms used in the specification are: (1) in paragraphs [0006] and [0023], the terms “TAT” and “RPT” have not been defined nor fully enabled; (2) in [0007] line 8, “not of limitation” should be changed to --not by way of limitation--; and (3) in [0019] lines 8 and 11, “additional masking an etching” (in line 8) should be corrected to --additional masking and etching-- and “through portion 100 the shifted 180

Art Unit: 1756

degrees” (in line 11) should also be corrected (e.g., to --through portion 100 [[the]] is shifted 180 degrees--, etc.). Note that due to the number of errors, those listed here are merely examples of the corrections needed and do not represent an exhaustive list thereof.

Appropriate correction is required. An amendment filed making all appropriate corrections must be accompanied by a statement that the amendment contains no new matter and also by a brief description specifically pointing out which portion of the original specification provides support for each of these corrections.

Claim Objections

Claims 13-14 are objected to because of the following informalities: in both claim 13 and claim 14, “regions comprises” should be corrected to --regions comprise[[s]]--. Claim 14 depends on claim 13. Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-7 and 15-20 are rejected under 35 U.S.C. 102(b) as being anticipated by Dao et al. (5,302,477).

Dao et al. teach an inverted phase-shifted reticle or mask (PSM) having adjacent inverted phase features with PS rims or phase edges between 0° and 180° phase features; and methods of

Art Unit: 1756

fabricating the PSM (title, abstract). The methods of fabricating the PSM include performing patterning or etching of an opaque chrome (Cr) mask layer 21 (instant claims 4 and 18) formed on a transparent quartz substrate 20 (as shown in Figure 7, instant claim 5) to expose a first region of the transparent substrate 20, which is etched to form a region 53 first opening (Figure 8). This is followed by performing additional patterning or etching of the opaque Cr layer to expose a second region of the transparent substrate (rim 27) adjacent to the first region (instant claims 1 and 15) to enlarge the first opening formed in the first region 26 (instant claims 2 and 16) over a continuous area of the transparent quartz substrate (as shown in Figures 9 and 10, col. 8 line 46 to col. 9 line 13, instant claims 3 and 17). In the PSM shown by Figure 4A, a first (etched) rectangular region 24 is adjacent to a second (unetched) rectangular region 27, in which both the first rectangular region 24 and the second rectangular region 27 are similarly shaped and sized (col. 5 line 67 to col. 8 line 3, instant claims 6-7 and 19-20).

Claims 1-7 and 15-20 are rejected under 35 U.S.C. 102(e) as being anticipated by Schroeder et al. (2003/0027057).

Schroeder et al. teach a phase shift mask 400 (PSM) and method of manufacturing the PSM (abstract). Figure 6A shows a PSM 400 having a transparent quartz substrate 402 (instant claim 5) with a first etched region 458 for a 180° phase feature and adjacent second unetched region 460 for a 0° phase feature next to an overlying patterned opaque chrome (Cr) layer 404 (paragraphs [0041-0047], instant claim 4). In the method of manufacturing the PSM, the opaque layer is preferably formed on the transparent substrate and patterned before etching of the underlying transparent substrate. Alternatively, the opaque layer can be patterned after etching the transparent substrate [0043]. The method for making the PSM in Figure 6A would be

Art Unit: 1756

expected to involve first patterning of an opening in the opaque layer, etching of the underlying transparent substrate at a first region 458 through the opening in the opaque Cr mask layer (instant claim 18), and additional patterning of the opaque layer to enlarge the opening (instant claims 2 and 16) that forms a second adjacent region 460, both formed over a continuous area of the transparent quartz substrate (instant claims 1, 3, 15, and 17). Figure 6B illustrates a top view of the PSM in Figure 6A that shows parallel lines for phase edges 420 and 452, as well as the adjacent edge of the patterned opaque Cr layer 404. These lines can extend only partially across the length of the mask 400 [0048], which is consistent with a rectangular first region 458 and an adjacent rectangular second region 460 having a similar shape and size to the first region (instant claims 6-7 and 19-20).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 6-7 and 19-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over either Dao et al. (5,302,477) or Schroeder et al. (2003/0027057) in view of either Levenson (6,251,549) or Rolfson (6,395,432).

While teaching other aspects of the instant claims, neither Dao et al. nor Schroeder et al. specifically teach a method of forming a PSM having adjacent first and second similarly shaped and sized rectangular 0° and 180° phase features or regions in the particular configuration shown by instant Figure 5A or instant Figure 6A (as specific examples of instant claims 6-7 and 19-20).

However, the particular configuration shown by instant Figure 5A or instant Figure 6A for a PSM having book-matched adjacent first and second similarly shaped and sized rectangular 0° and 180° phase features or regions is well known in the art of making PSMs, as exemplified by either Levenson (Figures 9-11, col. 6 lines 53-61) or Rolfson (Figure 12, col. 6 lines 28-36). So, it would have been obvious to one of ordinary skill in the art at the time of the invention in the methods of forming PSMs having adjacent first and second PS regions taught by either Dao et al. or Schroeder et al. to form these adjacent first and second PS regions in a book-matched configuration of similarly shaped and sized rectangular 0° and 180° phase features or regions (as taught by either Levenson or Rolfson), just as exemplified by instant Figures 5A or 6A, in order to achieve a corresponding desired imaged pattern through such a PSM (instant claims 6-7 and 19-20).

Claims 8-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over either Dao et al. (5,302,477) or Schroeder et al. (2003/0027057) in view of Tzu et al. (5,888,678).

Neither Dao et al. nor Schroeder et al. specifically teach forming additional third regions that are devoid of PS features.

Tzu et al. teach a PSM having separate PS mask patterns and non-PS binary mask patterns on the same mask substrate, as well as a method of forming this PSM (title, abstract). Formation of the PS mask patterns and binary mask patterns on the same transparent mask substrate increases throughput and decreases cost in the fabrication of integrated circuit wafers (abstract).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention in the methods of forming PSMs having adjacent first and second PS regions taught by

Art Unit: 1756

either Dao et al. or Schroeder et al. to form additional third binary mask pattern regions that are devoid of PS features on the same transparent mask substrate, in order to increase throughput and decrease cost in the fabrication of integrated circuit wafers, as taught by Tzu et al. (instant claims 8-14).

Claims 13-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over either Dao et al. (5,302,477) or Schroeder et al. (2003/0027057) in view of Tzu et al. (5,888,678), and further in view of either Levenson (6,251,549) or Rolfson (6,395,432).

While teaching other aspects of the instant claims, none of Dao et al., Schroeder et al., nor Tzu et al. specifically teach a method of forming a PSM having adjacent first and second similarly shaped and sized rectangular 0° and 180° phase features or regions in the particular configuration shown by instant Figure 5A or instant Figure 6A (as specific examples of instant claims 13-14).

However, the particular configuration shown by instant Figure 5A or instant Figure 6A for a PSM having book-matched adjacent first and second similarly shaped and sized rectangular 0° and 180° phase features or regions is well known in the art of making PSMs, as exemplified by either Levenson or Rolfson, as discussed above. So, it would have been obvious to one of ordinary skill in the art at the time of the invention in the methods of forming PSMs having adjacent first and second PS regions and separate additional third binary mask pattern regions that are devoid of PS features on the same transparent mask substrate, as taught by either Dao et al. or Schroeder et al. in combination with Tzu et al., to form the adjacent first and second PS regions in a book-matched configuration of similarly shaped and sized rectangular 0° and 180° phase features or regions (as taught by either Levenson or Rolfson), just as exemplified by

Art Unit: 1756

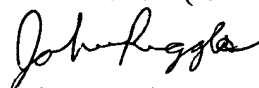
instant Figures 5A or 6A, in order to achieve a corresponding desired imaged pattern through such a PSM (instant claims 13-14).

Conclusion


Any inquiry concerning this communication or earlier communications from the examiner should be directed to John Ruggles whose telephone number is 571-272-1390. The examiner can normally be reached on Monday-Thursday and alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff can be reached on 571-272-1385. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



John Ruggles
Examiner
Art Unit 1756



**S. ROSASCO
PRIMARY EXAMINER
GROUP 1500**